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ABSTRACT

Environmental education, as a teaching methodology, is appropriate for all subject areas and environments. Two teaching approaches are presented with the 13 activities in this booklet serving as examples of their application to the forest environment and different disciplines. The first approach is based upon the understanding that learners retain more information if it is presented through thinking skills processes rather than by factual memorization. Each activity has learners use one or more of the thinking skills processes as adapted by the U.S. Forest Service. The second approach, a questioning strategy, uses four kinds of questions in a sequence: open, focus, interpretive, and summary. Each activity lists questions based upon this strategy. In addition to the thinking skills and questions, information for each activity indicates the objectives, time necessary to complete, numbers of students (individuals, class, groups), location, equipment, and procedures. Topics include, among others, family tree, leaves, bark, forest floor, rotten stump, change, and the urban forest. Other activities are suggested for different subject areas. (DC)

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BACKGROUND INFORMATION

In Ohio Environmental Education is described as a continuous process of learning which emphasizes interrelationships within and among all systems.

This implies that many different ways of learning are equally valid; that environmental education is concerned with interrelationships and that it includes both *human* and *natural* components.

Ohio's goal for environmental education is to provide all individuals with the necessary opportunities and experiences which will help them become:

KNOWLEDGEABLE about types of environments and associated processes;

SENSITIVE to the interrelationships of human and natural actions;

MOTIVATED to consistently practice stewardship; and

COMMITTED to developing these characteristics in oneself and others.

Gradually, after several years, the concept of environmental education is changing. It is being viewed more and more as a methodology, a way of teaching, rather than another subject area which must be "fitted in" or "added to" the school curriculum.

Further, many individuals are beginning to realize that the science or biology disciplines do not have a monopoly on the study of environments or the use of environmental education methodologies.

This teaching aide has been developed to assist educators (teachers and resource people) in facilitating learning experiences by environmentalizing the curriculum. These studies were developed and adapted to be used in either a classroom or field experience. Participation by the students is the key ingredient with the educator acting as a facilitator rather than a relator of facts.

These activities have evolved from three basic understandings:

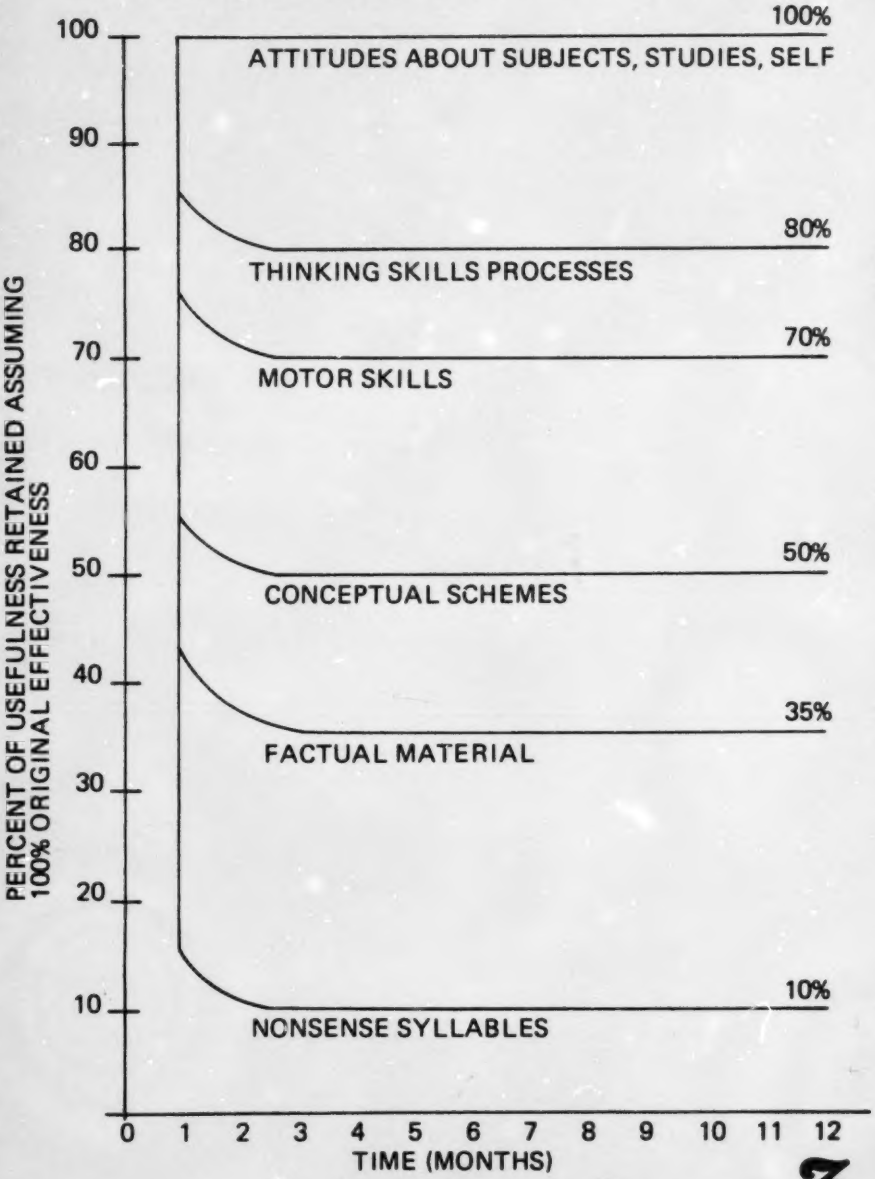
There are certain survival values associated with different learning frameworks. Refer to the Survival Chart (diagram pg. 3). This paradigm indicates some very important considerations. If a student "learns" one hundred percent of all the information presented to him during a school year, twelve months later there are general retention percentages which are observable. Classroom teachers usually conduct a review at the beginning of each year to assess this level in their classes.

Factual material (dates, places, names) upon which much of the current educational effort is placed indicates only a thirty-five percent retention level. Conceptual schemes do slightly better at fifty percent. This indicates that a different approach to "education" is desirable.

The area of attitudes and values, with a high retention rate, is gradually loosing some of the stigma associated with it, and is being integrated into a variety of disciplines and methods.

SURVIVAL VALUES IN LEARNING

Used in the Higher Level Thinking Ability Course - Northwest Educational Research Laboratory - as an interpretation from *Education Psychology* - Cronbach Harcourt Brace & World 1963.



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An important consideration fundamental to the following studies, is the use of Thinking Skills Processes. These skills are basic to everyone. Each of us use them in many of our daily activities. Rarely though do we identify each of the skills utilized and little emphasis is placed on these components in teaching situations. (an exception would be the scientific method discussed in science classes.)

By familiarizing students with these skills and teaching how to effectively use them, the facilitator can explore or investigate any variety of disciplines or environments with equal ease.

The activities within this pamphlet are designed to utilize and strengthen the Thinking Skills Processes as adapted from the U.S. Forest Service.

OBSERVING - Using all of the senses to determine that which is perceptable through: hearing, seeing, tasting, smelling and feeling.

CLASSIFYING - Identifying objects or ideas and dividing them into groups according to similarities or differences.

MEASURING - Determining characteristics using standard or invented units (length, weight, volume, time etc.)

PREDICTING - Estimating or foretelling *future* events based on some known data or evidence.

INFERRING - Judging or deciding by reasoning based on known facts or evidence.

COMMUNICATION - Giving or exchanging information through speech, gestures or written material.

EXPERIMENTING - Testing, trying or comparing ideas, theories or facts against the controls (known data) to understand or answer an unknown.

INTERPRETING DATA - Communicating or explaining data collected through observation, measuring or experimenting.

FORMULATING HYPOTHESIS - Developing unproved theories or ideas that require additional facts gained through observing, measuring or inferring.

To effectively work with the Thinking Skills, the activities and each of their sections outlined follow a definite Questioning Strategy. This procedure follows through four sequential steps. By using this strategy, the facilitator can provide a meaningful learning experience in : y setting.

a. OPEN question - designed to provide an opportunity for all persons to participate and to obtain a body of data (facts, concepts, ideas) upon which to focus. *The character is unrestricted.*

b. FOCUS question - designed to focus thought on specific data that will be compared or contrasted to other data later in the discussion. *The characteristic is specificity.*

c. INTERPRETIVE question - designed to compare, contrast, and seek logical relationships between specific points brought out in the focus question. *The characteristic is focusing on relationships.*

d. SUMMARY question - designed to obtain conclusion, summary or closure. No new data introduced. *The characteristic is conclusiveness.*

Each question represents a separate task that the students should perform to gain a better understanding of the concept presented.

In compiling these activities many considerations were studied to provide:

Objective	concept you as an educator are trying to develop
Time	minimum required - most can be expanded as your schedule permits
Participation	designed to stimulate involvement and individual success by working in small groups
Location	suggestions only; you can best judge which areas you have available
Equipment	kept to a minimum
Confidence	!!!!!!!!!!

THREE FOREST FACTS

OBJECTIVE: Students will understand the value of the forest as a manageable resource.

TIME: 15-30 minutes

NUMBER: Classroom size; students work independently

LOCATION: Anyplace

EQUIPMENT: Chalk board or poster, writing implement

THINKING SKILLS USED: Inferring, Interpreting data, Predicting, Communicating

ACTIVITY: List these three facts so all can see:

25% of Ohio is covered by forests
92-94% of forested land is owned by private landowners or companies
18 State Forests; most located in SE Ohio

QUESTIONING STRATEGY:*

OPEN: Why are forests valuable?

FOCUS: What kinds of industries depend on forests?

INTERPRETIVE: How can Ohio maintain a supply of wood?

SUMMARY: "Conservation of forests means..."

*Students should be encouraged to share their ideas with the entire class about each question.

FAMILY TREE

OBJECTIVE: Students will understand that tree growth rate is determined by species, location, sunlight and availability of food and water.

TIME: 15-20 minutes

NUMBER: Each student works independently

LOCATION: Anyplace

EQUIPMENT: One limb or trunk cross-section for each student. (This should be given to students to keep at the end of the activity.)

THINKING SKILLS USED: Observing, Measuring, Interpreting data, Communicating

ACTIVITY: Distribute a cross-section to each student. Ask them to write down the observable characteristics.

QUESTIONING STRATEGY:*

OPEN: Describe your cross-section. (accept color, size, bark characteristics, number of rings, etc.)

FOCUS: Describe the rings in your cross-section.

INTERPRETIVE: Looking at the rings, what can you say about the tree's past?

SUMMARY: What determines the growth of a tree?

Have the students make this into a "Family Tree" by placing a dot or pin in the corresponding growth rings for past events in their life.

example:
- year you entered school
- year you were born
- year a brother or sister was born
- year the school was built
- year your parents married
- year your parents moved to this town

*Students should be encouraged to share their ideas about each question with the entire class.

BARK

OBJECTIVE: Students will learn that trees have different characteristics as do people.

TIME: 20-30 minutes

NUMBER: Classroom size, students work independently

LOCATION: Forest, woodlot, classroom

EQUIPMENT: Chart paper or newsprint, chalk, crayons, charcoal

THINKING SKILLS USED: Observing, Classifying, Experimenting, Interpreting data, Communicating

ACTIVITY: Give each student a piece of paper and writing instrument (chalk, etc.). Have them make a rubbing of a tree's bark.

QUESTIONING STRATEGY:*

OPEN: What are the parts of a tree? (accept trunk, roots, leaves, stems, bark, etc.)

FOCUS: What words describe the bark of your tree?

INTERPRETIVE: Compare the bark of your tree with others in the area.

SUMMARY: Why is a tree's bark important?

*Students should be encouraged to share their ideas about each question with the entire class.

LEAVES

OBJECTIVE: To make students aware of leaf differences, function, and value.

TIME: 20-30 minutes

NUMBER: Classroom size, students work independently

LOCATION: Anyplace

EQUIPMENT: None (If class outside, students should collect their own leaves. In classroom, leaves should be provided.)

THINKING SKILLS USED: Observing, Communicating, Inferring, Formulating hypothesis

ACTIVITY: Each student should obtain or be given a leaf. After observing their leaf the students should respond to the following questions.

QUESTIONING STRATEGY:*

OPEN: What are the parts of a tree?

FOCUS: Describe your leaf. (accept terms such as rounded, crooked edges, etc.)

INTERPRETIVE: What functions do leaves have on the surrounding area? (soil, temperature, small plants, O_2 production, impact of rain drops, etc.)

SUMMARY: Describe in your own words why leaves are important to the forest.

*Students should be encouraged to share their ideas about each question with the entire class.

LEAF CHARACTERISTICS

OBJECTIVE: To have students identify patterns and diversity of five different leaves found in a forest area (forest floor).

TIME: 20-30 minutes

NUMBER: Groups of 4 or 5

LOCATION: Anyplace

EQUIPMENT: The members of each group should have different leaves (gathered by students or provided and a sheet of paper for each group.

THINKING SKILLS USED: Observing, Classifying, Formulating hypothesis, Interpreting data, Communicating

ACTIVITY: Each student will study their leaf and record its observable characteristics.

QUESTIONING STRATEGY:*

OPEN: (directed to groups) What do you notice about your leaf? (accept vein pattern, texture, color, shape).

FOCUS: (directed to individual students) Describe the_____ of your leaf sample. (choose one of the characteristics indicated in response to the open question.)

INTERPRETIVE: (Directed to individual students) How does your leaf compare with others in your group?

SUMMARY: (directed to class) What can we say about leaf characteristics.

*Students should be encouraged to share their ideas about each question with the entire class.

FOREST FLOOR

OBJECTIVE: Students will understand the concept of forest litter and how it relates to soil makeup and water retention.

TIME: 20-30 minutes

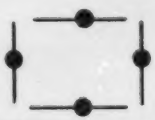
NUMBER: Groups of four

LOCATION: Forest

EQUIPMENT: Pencils, study sheets

THINKING SKILLS USED: Observing, Predicting, Classifying, Experimenting, Interpreting data, Communicating

ACTIVITY: Have the students divide into groups of four. Each group should outline their study area by facing each other and stretching out their arms.



QUESTIONING STRATEGY:*

OPEN: (to entire group) what makes up the forest floor? (accept broken twigs, leaves, small plants, etc.)

FOCUS: (to individual groups) List the types of material in the soil.

INTERPRETIVE: How does this compare with the soil around your home or school yard? (idea of soil compaction)

SUMMARY: Describe in your own works why soil is "alive."

*Students should be encouraged to share their ideas about each question with the entire class.

PLANT ODORS

OBJECTIVE: Students will develop an appreciation for forest plants by learning about their smell, taste, and arrangement of buds.

TIME: 30-60 minutes

NUMBER: Groups of 4 or 5

LOCATION: Anyplace

EQUIPMENT: Samples of forest plants with distinctive smells or tastes (wintergreen, wild onion, sassafras, spice bush, etc.). Sketch paper and pencil.

THINKING SKILLS USED: Observing, Communicating, Interpreting data, Experimenting

ACTIVITY: (if time permits, students can investigate the areas where the specimens grow or help in gathering them) Have the individuals observe the specimens given to each group. (This activity may be conducted with each group having a different specimen or each individual of the group having a different specimen).

QUESTIONING STRATEGY:*

OPEN: What do you notice about the plant specimen(s)? (accept bud arrangement, smell, color, etc.)

FOCUS: Sketch your specimen and describe the smell.

INTERPRETIVE: How do these compare to plants you have at school or home? (this can be a homework assignment)

SUMMARY: How do we use plants that have distinctive odors?

*Students should be encouraged to share their ideas about each question with the entire class.

ROTTEN STUMP STUDY

OBJECTIVE: Students will gain an insight into natural recycling.

TIME: 30 minutes

NUMBER: Groups of 4 or 5

LOCATION: Mature forest with numerous stumps

EQUIPMENT: None

THINKING SKILLS USED: Observing, Measuring, Predicting, Communicating, Interpreting data

ACTIVITY: Involve the students with the forest from the beginning (ask open question). Allow each group of students to examine a stump. (10 minutes) DO NOT TEAR THE STUMP APART!!!!!!! Have the students explain why.

QUESTIONING STRATEGY:*

OPEN: What do you notice about the forest surroundings? (accept dead trees, undergrowth, old stumps, etc.)

FOCUS: What things do you notice about the stump?

INTERPRETIVE: What are the effects of the living and non-living things acting upon the stump?

SUMMARY: Of what value are rotting stumps to a forest?

*Students should be encouraged to share their ideas about each question with the entire class.

THE SUN AND THE FOREST

OBJECTIVE: Students will understand the role of the sun in making the forest a living, renewable community.

TIME: 20-30 minutes

NUMBER: Classroom size, students work independently

LOCATION: Mature forest

EQUIPMENT: Writing materials for each student

THINKING SKILLS USED: Observing, Inferring, Interpreting data

ACTIVITY: Take the group from the edge of a forest into a heavily shaded area of the forest. Have them record their observations.

QUESTIONING STRATEGY:*

OPEN: List your observations about the environment at the edge of the forest and the interior.

FOCUS: What influences the undergrowth in these areas? (accept sunlight, space, soils, trimming, etc.)

INTERPRETIVE: Move to an opening in the forest canopy. How does this area compare with the growth at the forest's edge.

SUMMARY: How does the sun affect the forest floor?

*Students should be encouraged to share their ideas about each question with the entire class.

CHANGE IN A FOREST

OBJECTIVE: Students will understand that no event or condition is an isolated happening but that all are interrelated or interdependent.

TIME: 30 minutes

NUMBER: Groups of 4 or 5

LOCATION: Forest area

EQUIPMENT: Writing materials for each group

THINKING SKILLS USED: Communicating, Observing, Predicting, Interpreting data, Formulating hypothesis

ACTIVITY: Ask each group of students to work as a team. This activity gives the students an opportunity to succeed in expressing themselves and how they use evidence or clues to determine what has happened in an area.

QUESTIONING STRATEGY:*

OPEN: What makes up a forest community?

FOCUS: What do you see as indications of evidence of change?

INTERPRETIVE: What do you think are the probable causes of change?

SUMMARY: Describe the way the area may have looked 25 years ago. Describe the way the area might look 25 years from now.

*Students should be encouraged to share their ideas about each question with the entire class.

MICRO-ENVIRONMENT INVESTIGATION

OBJECTIVE: Students will better understand the relationship between trees and their environment.

TIME: 20-30 minutes

NUMBER: Groups of 4 or 5

LOCATION: Woods, park area, anyplace with trees

EQUIPMENT: Increment borer (optional)

THIKING SKILLS USED: Observing, Measuring, Inferring, Communicating, Experimenting, Interpreting data

ACTIVITY: Allow the student groups 10 minutes to investigate the study area.

QUESTIONING STRATEGY:*

OPEN: Describe the area you are investigating. (accept terrain, moisture, density and size of trees, other plants, evidence of erosion).

FOCUS: List those aspects of your micro-environment that affect the growth of trees (sunlight, water, air quality, insects, disease, and space).

INTERPRETIVE: What would help improve the growth of the trees in this area?

SUMMARY: If we wanted to plant a tree, what would be some important considerations?

*Students should be encouraged to share their ideas about each question with the entire class.

EXPERIENCING THE FOREST

OBJECTIVE: Students will observe the similarities and differences of two forest environments.

TIME: 60 minutes

NUMBER: Groups of 4 or 5

LOCATION: Area with two different forest habitats - preferably a pine plantation and a deciduous woodlot.

EQUIPMENT: task card with chart indicated below

THINKING SKILLS USED: Observing, Communicating, Measuring, Experimenting, Interpreting data

ACTIVITY: Each group will visit the different habitats and record their observations on the task card.

QUESTIONING STRATEGY:*

OPEN: What do you notice about this forest?

FOCUS: What do you feel, smell, and hear as you stand quietly for several minutes?

	deciduous woodlot	pine plantation
temperature		
smells		
feel of forest floor		
sounds		

INTERPRETIVE: How are the areas alike? different?

SUMMARY: What are your feelings about a forest environment?

*Students should be encouraged to share their ideas about each question with the entire class.

THE URBAN FOREST (BLOCK STUDY)

OBJECTIVE: Students will understand that trees and shrubs play a vital role within our cities and suburbs.

TIME: 50 minutes (includes 30 minutes for plotting tree & shrub locations)

NUMBER: Classroom size, students work in 2 or 4 groups depending on how many sections into which the neighborhood block is divided.

LOCATION: Neighborhood block within the city or suburbs

EQUIPMENT: Large sheet of paper cut into 2 or 4 sections to represent the neighborhood block.

THINKING SKILLS USED: Observing, predicting, inferring, communicating, interpreting data

ACTIVITY: Assign each group of students a section of the neighborhood block on which to plot the trees and shrubs visible from the sidewalk. It may be helpful to show the various sizes of trees with various sized dots.

After returning from the walk, have the students place their plotted sections together to form the original neighborhood block.

QUESTIONING STRATEGY:

OPEN: What types and patterns of plantings are visible?

FOCUS: What uses do they serve?

INTERPRETIVE: Imagine this block without trees and shrubs. What changes would there be?

SUMMARY: Why is it important that we promote the use of trees and shrubs within our communities?

How to use the forest as a teaching tool. These suggestions for additional activities are listed by disciplines for convenience only. The activities may be applicable to several areas.

ART

-bark rubbings
-collage of tree materials or forest products
-natural dying
-sketching with natural materials
-study and reproduction of textures
-other

MATH

-determining board feet; linear measurements, weight
-teaching geometry: diameter, circumference, volume, cylinders
-graphs
-statistical counting and plotting, frequency
-ratios
-other

LANGUAGE

-poems (writing and/or reading)
-readings in literature
-writing descriptive sentences
-building vocabulary
-developing narratives
-other

SOCIAL STUDIES

-study of cross-sections (compare with historical development of area)
-research and interviews regarding changing neighborhoods and land use
-study of aerial photographs (available from SCS)
-historical uses of wood
-comparative sociology (city & forest)
-other

SHOP - INDUSTRIAL ARTS

-study of wood types, values, and uses
-trip to timber stand, lumber mill, processing or utilizing plant
-study of grades, grains, and defects - causes and effects - solutions
-comparison of wood products with synthetics
-construct a useful object out of forest product (carving)
-other

MUSIC

-use of wood in musical instruments - visit a craftsperson, manufacturing plant
-recording sounds of a forest
-writing original composition expressing feelings and attitudes about or of a forest
-natural musical instruments - acorn caps, hollow logs, rocks, seed pods, etc.
-listen to selections about or using a forest theme
-other

HEALTH OR PHYSICAL EDUCATION

-study of health related products from forest areas
-natural obstacle course
-importance of forests (mental and physical health)
-comparative anatomy (man and trees)
-interpretive movement (dance)
-other

HOME ECONOMICS

-textiles and fibers from forests
-wood used in furniture and home accessories
-forest products and their uses in the home
-wild food study - collecting, preparing
-landscaping
-other

SCIENCE

-check any reference book--need more be said

OTHER